

1.0

ABOUT THIS REPORT

WHAT THIS REPORT INCLUDES

Resilient Northeastern NJ (NENJ) is an initiative dedicated to increasing community resilience and improving quality of life for all people who live, work, and play in Jersey City, Newark, Hoboken, and Bayonne. These four municipalities, Hudson County, and two community-based organizations—Ironbound Community Corp. and HOPES CAP, Inc.—comprise the Region Team. The New Jersey Department of Environmental Protection (NJDEP) Bureau of Climate Resilience Planning (BCRP) funds and administers the program, with funding from the U.S. Department of Housing and Urban Development (HUD). It is one of four pilot planning regions under the Resilient NJ program umbrella.

This Action Plan is the culmination of almost two years of planning, coordination, and engagement to create recommendations to address climate-related hazards while building off and supporting existing efforts in the region. Resilient NENJ intends for this Action Plan to be a roadmap, providing clear next steps to implement the recommended resilience strategies. The Action Plan is organized into the following sections:

SECTION 2.0: HOW DID WE GET HERE?

Provides background on the region, the planning process, and the community vision, as well as information on the completed impact assessments and work that is already being done in the region, which contributed to development of this Action Plan.

SECTION 3.0: PREFERRED SCENARIO AND RECOMMENDATIONS

Outlines actions that can help build physical, environmental, social, economic, and institutional resilience. It includes “cut sheets” of actions that can be torn out and shared or referenced to help drive change.

SECTION 3.1: OVERVIEW AND HIGHLIGHTS

Provides an overview of the recommended actions and how they can create change in the region.

SECTION 3.2: ACTIONS THAT WILL CHANGE OUR BUILT AND NATURAL ENVIRONMENT

Outlines actions to address coastal and tidal flooding, stormwater flooding, and other climate-related and environmental justice needs through physical changes.

SECTION 3.3: ACTIONS THAT WILL CHANGE THE WAY WE WORK TOGETHER

Details actions that improve policy and governance, support outreach, education, and capacity-building, develop or enhance services and programs, and support emergency preparedness and response.

SECTION 4.0: IMPLEMENTATION PATHWAYS

Provides information on project development cycles and funding, capacity, and resource needs and ways to answer questions of who, when, and how the actions can be implemented.

SECTION 5.0: ROADMAP

Provides details on the potential costs, timeline, and next steps the region can take to coordinate, fund, and implement the Action Plan to build a thriving and resilient community.

WHAT YOU NEED TO KNOW AND WHAT YOU CAN DO NEXT

Everyone has a role to play in reducing flood risk and increasing resilience in NENJ. The information in the chart below provides additional guidance on next steps that different groups of stakeholders in NENJ can take to help share and implement this Action Plan. Check out other suggestions throughout this Action Plan to get or stay involved in ways that work for you.

IF YOU ARE	WHAT YOU NEED TO KNOW	WHAT YOU CAN DO NEXT
A RESIDENT, BUSINESS OWNER, OR PROPERTY OWNER IN THE REGION	<ul style="list-style-type: none">• Building resilience in the region depends on you and the actions you advocate for and take to reduce flood risk to your home, business, or property• Your voice matters in this process and in making changes that affect your community. Your elected officials need to hear from you• This Action Plan includes a variety of strategies that may affect the places you care about, so review it and stay involved in the process as strategies are implemented	<ul style="list-style-type: none">• Know your risk today and in the future and take steps to improve preparedness, including following alerts and warnings when hazards are in the forecast• Purchase and maintain flood insurance• Reach out to elected officials to support actions you want to see happen• Share this plan with your friends, family, and neighbors
A REPRESENTATIVE OF A COMMUNITY-BASED ORGANIZATION	<ul style="list-style-type: none">• This Action Plan recommends a variety of strategies that will involve partnership and coordination with organizations like yours• Implementation of this plan provides an opportunity for strategies to realize additional benefits including those for your organization & people you work with• Effective implementation of this Action Plan will involve ongoing conversations with community members, and you can play a key role as a leader and conduit to communities	<ul style="list-style-type: none">• Carefully review this Action Plan and stay informed about and involved in the implementation process by coordinating with Resilient NENJ, and municipal and county staff• Work with municipal and county staff to identify partnership opportunities that advance identified resilience strategies• Help raise public awareness of flood and other climate hazards risk and the Action Plan through your networks
A MEMBER OF MUNICIPAL, COUNTY, OR STATE STAFF	<ul style="list-style-type: none">• This Action Plan recommends strategies that affect property, infrastructure, and services owned and managed by municipalities and counties in the region and various NJ State agencies• Municipal, County, and State agency staff will lead implementation of many of the recommended strategies• Effective implementation will require active coordination and involvement of staff across municipal, County, and State departments and functions	<ul style="list-style-type: none">• Carefully review this Action Plan and stay informed about and involved in the implementation process and advocate for implementation of priority strategies• Support finding, developing, and overseeing funding opportunities from various sources• Share the Action Plan with colleagues

2.0

HOW DID WE GET
HERE?

PROJECT TIMELINE AND PROCESS

Resilient NENJ's Steering Committee includes representatives from each of the Region Team entities. This group meets regularly with support from NJDEP and a team of resilience experts. A Community Advisory Council (CAC) also guides the project, provides early feedback on materials, and helps to plan engagement. The CAC is a diverse group of twelve community members, three from each of the four municipalities. They help ensure that the project centers the voices of people who have been historically underrepresented or excluded from planning processes.

Resilient NENJ builds off resilience-related work that is already taking place in the region and across the state by integrating recommendations, coordinating with leaders of other initiatives, and avoiding duplication of efforts (see **Section 2.7**).

Resilient NENJ structured the Action Plan process to gather input and regularly report out on progress. The team continuously integrated feedback into decision-making, technical evaluations, recommendations, and engagement efforts.

The Action Plan development process kicked off in Spring 2021 with the release of the **About Our Region** report. This report summarizes the region's infrastructure, people, and places, as well as the work already underway. The visioning process, conducted Spring to Fall 2021, established long-term goals for the future of the region (see **Section 2.3** and the **Vision & Priorities** report for more detail on the regional community vision). The team also used visioning feedback to refine NJDEP's draft evaluation criteria used to compare individual actions and solution scenarios (options). This vision therefore set the direction of this Action Plan and all recommendations.

Resilient NENJ began with a focus on flooding, which is an important issue in the region. Although Hurricane Sandy occurred ten years before the release of this Action Plan, residents still remember its widespread impacts. The many significant rainfall events that occurred during this planning process demonstrate the impacts flooding has on daily quality of life. In September 2021,

the remnants of Hurricane Ida caused significant flooding and resulted in a federal Major Disaster Declaration that included Hudson and Essex Counties. Feedback in the aftermath of Ida and other flooding in the summer of 2021 led Resilient NENJ to conduct additional engagement with local and state emergency managers to develop an Ida After Action report and accompanying recommendations.

An After Action is a document intended to capture observations of an event or exercise and make recommendations based on the outcomes of the event or exercise.

Resilient NENJ conducted a detailed assessment to evaluate the impacts of flooding on the region's people, infrastructure, and other systems using new flood models NJDEP developed for this project. The **Flood Impact Assessment** (see **Section 2.4**) summarizes the findings of this effort and includes estimates of possible damages from current and future flood events. The **Flood Impact Assessment**, the **Vision & Priorities** report, and **Ida After Action** report provide more detail on the nature of various flood events that occurred in recent years and impacts on people's lives, property, and regional infrastructure.

Community feedback also led to the expansion of the Action Plan to consider other climate-related hazards. Community based organizations and community members expressed early in the project that certain other issues concern them at least as much as flooding. Extreme heat and poor air quality, for example, may be exacerbated by climate change and are significant concerns in the region (see **Section 2.5** for more detail on the findings of the **Climate Hazards Assessment**).

Long-Term Control Plans (LTCPs), which are a regulatory requirement for combined sewer utilities, also address water quality hazards by reducing pollutant discharge and mitigating flooding through sewer system improvements. Resilient NENJ reviewed the LTCPs of the utilities that serve this region to ensure that the plans complement each other. Resilient NENJ integrated findings from these additional assessments (see summaries in **Appendix G**) into the development of recommendations.

Resilient NENJ also heard concerns related to the interaction between toxic chemicals and flooding due to the density of contaminated sites in the region.

Responding to this feedback, Resilient NENJ studied risks related to known contaminated sites and brownfield sites in the area, including the potential role of groundwater rise in increasing risk (see **Appendix H**).

Resilient NENJ used these technical assessments and toolboxes of solutions partnered with the engagement process to develop initial solution options. Resilient NENJ first organized solutions into three scenarios (see **Section 2.6** and the **Scenario Development** report), or suites of actions, to help understand different options and approaches. Feedback on the three scenarios and technical evaluations helped the team to develop the preferred scenario and recommendations, presented in **Section 3.0** in this plan.

THE ACTION PLAN DEVELOPMENT PROCESS



PREVIOUSLY PUBLISHED NENJ REPORTS



ABOUT OUR REGION

Describes key aspects, features, and hazards of the region and its cities.



VISION & PRIORITIES

Summarizes what the team heard through engagement from spring to fall 2021 and what Resilient NENJ understands is the region's vision for itself.



FLOOD IMPACT ASSESSMENT

Summarizes what will likely happen under certain coastal storm, rainfall events, and tide conditions if nothing more is done to protect the region from current and future flooding.



CLIMATE HAZARDS

Summarizes findings on how climate-related hazards affect the region today, how risk will evolve, and the types of impacts expected.



IDA AFTER ACTION

Summarizes the remnants of Hurricane Ida event and recommendations from the emergency management community based on lessons learned in response and recovery.



SCENARIO DEVELOPMENT

Presents possible scenarios, or suites of actions, evaluated for inclusion in the Action Plan.

PLANNING ON OUR FEET

Some community members shared early on that they need to see action to trust and want to engage with the Resilient NENJ process. In response, Resilient NENJ worked with the State, municipalities, and other stakeholders to submit four funding applications to the Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) program for Fiscal Year 2021 (FY2021) to advance physical projects that can mitigate risks. Hoboken also submitted a fifth application for expansion of their resilience park. FEMA advanced four of the five applications for funding under the FY2021 allocation, and the fifth, McGovern Park, may be resubmitted for FY2022 or another future round. These projects will protect the lives and property of hundreds of people.

1. In Newark, Resilient NENJ partnered with Newark Public Schools to develop a pilot resilience hub based on feedback received early in the project. A resilience hub is a central gathering point in times of need with access to information and resources and may double as an emergency shelter. Newark's pilot will take place at Ironbound's Ann Street School. Due to the severity of flood risk in Newark, the pilot location is incorporating subsurface stormwater storage and pervious pavement to mitigate flooding in addition to central air conditioning and power resilience improvements. Ultimately, the **Ironbound Resilience Hub** project will reduce recurrent flooding for 60 homes and 17 businesses and schools. This effort will reduce flood risk to hundreds of people in the Ironbound neighborhood, providing \$53 million in expected avoided losses in flood risk alone. It will also provide a cooling center, consistent power supply, and critical resource for community members to go to in times of emergencies.
2. In Jersey City, the **McGovern Park Resilience Project** if funded through a future cycle of the BRIC program or other source, would leverage existing park and open space to capture stormwater that currently floods approximately 80 homes.
3. In Bayonne, the **Cottage Street Flood Mitigation Project** will mitigate repetitive flooding to 32 structures through both underground storage and increasing the capacity of the stormwater conveyance system.
4. Also in Bayonne, the **63rd Street Pumping Station Power & Flood Resilience Project** will stop sewage from entering the homes of elderly people in the community, it did multiple times in 2021. There are 59 properties directly benefitting from this project, and at least 177 people will hopefully never again have to deal with the stress of having raw sewage backup into their homes once this project is complete.
5. Hoboken submitted an application to expand the **Southwest Resilience Park**, a public park that includes green infrastructure like rain gardens, porous pavers, rainwater harvesting, and underground storage to manage stormwater and provide green space. The expansion will continue the benefits of the Rebuild by Design – Hudson River project, which includes coastal flood barriers and rainfall flood mitigation components, as described in more detail in **Section 2.7**.

ENGAGEMENT PROCESS

Resilient NENJ provided various forums for feedback to ensure that people with different needs and preferences could participate. The COVID-19 pandemic required most engagement to be virtual, although in-person engagement opportunities also happened when safe, feasible, and accessible. Resilient NENJ held five regionwide virtual community meetings open to all community members. Live Spanish and American Sign Language (ASL) interpreters attended each and contributed valuable services to the process. Recordings in Spanish and English with ASL interpretation, meeting materials, virtual meeting boards, and summaries of meetings, as well as opportunities to continue to provide feedback on meeting content, exist on the project website. Resilient NENJ hosted a virtual community forum for Newark residents following Ida, and other cities hosted similar events to provide resources to residents. In March and April of 2022, Resilient NENJ held several city-specific community meetings to gather feedback on the three scenarios and recommendations that are unique to individual cities. Site visits, small group meetings and interviews, and electronic formats provided opportunities for direct engagement.

MULTIPLYING ENGAGEMENT

Many community-based organizations and other neighborhood and advocacy groups work with people in local communities throughout the region. Resilient NENJ reached out to these groups to learn about their needs and insights, and to help multiply engagement (spread and grow involvement). Resilient NENJ held engagement partner meetings in May of 2021 and September of 2022 to provide additional information and resources to community-based organizations so that they could conduct their own meetings (using meetings-in-a-box), share materials with their networks, and provide direct feedback on the project and engagement processes. Resilient NENJ also participated in multiple existing partner meetings when invited or permitted to do so.

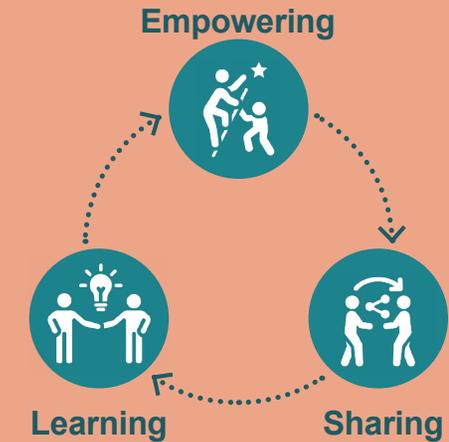
LANGUAGE ACCESSIBILITY

Resilient NENJ and NJDEP translated key outreach materials into 10 different languages and provided ASL and Spanish interpreters at each meeting. NJDEP translates reports into Spanish. **Section 3.3** includes recommendations to improve language accessibility. Recommendations will help increase direct engagement with and welcoming of non-English speaking and Deaf and Hard of Hearing communities.



The project description flyer was translated into Arabic, along with the 9 other languages prioritized for this region.

GUIDING PRINCIPLES



- Meet people where they're at
- Honor their history and expertise
- Understand that people have conflicting priorities, particularly right now
- Make the time mutually valuable
- Show how feedback is incorporated in the planning process

Representatives of government, municipal departments, utilities, infrastructure agencies, State agencies, and similar programs will be key to implementation of the Action Plan. Resilient NENJ engaged these groups at various times throughout the process to ensure that recommendations align with their priorities and capabilities. This engagement, along with other engagement activities, will need to continue moving forward (see **Section 3.3**).

Resilient NENJ collected feedback continuously through anytime engagement opportunities, which included surveys (both online and in print), report-specific feedback forms, the Irys app, and various contact avenues including email, multi-lingual hotline voicemail, and social media. The team shared project description flyers and meeting promotion flyers electronically and in print. The team shared announcements about meetings, deliverables, and other updates on social media and with Resilient NENJ’s opt in email list. Social media accounts (@resilient_nenj on Instagram and @resilientNENJ on Facebook and Twitter) also shared other content related to resilience, flooding, and other hazards. All materials, reports, and additional project information are available at www.resilient.nj.gov/nenj. Most materials and major reports are available in English and Spanish, and flyers and surveys are available in English, Spanish, and nine other languages prioritized based on the needs of the region.

Resilient NENJ adapted the engagement process continuously based on input from the Steering Committee, CAC, community-based organizations, other project participants, as well as the types of decisions and analyses being completed at any major milestone. The team worked to leverage existing events, festivals, and meetings to share project-related information. Resilient NENJ developed additional engagement materials such as educational videos and a Faces of Resilience social media series and collaborated with schools and community-based organizations to conduct youth engagement. These efforts are already working to advance some of the recommendations in this plan detailed in **Section 3.3.2**.

See **Appendix I** for detail on the engagement process to date (as of September 2022).

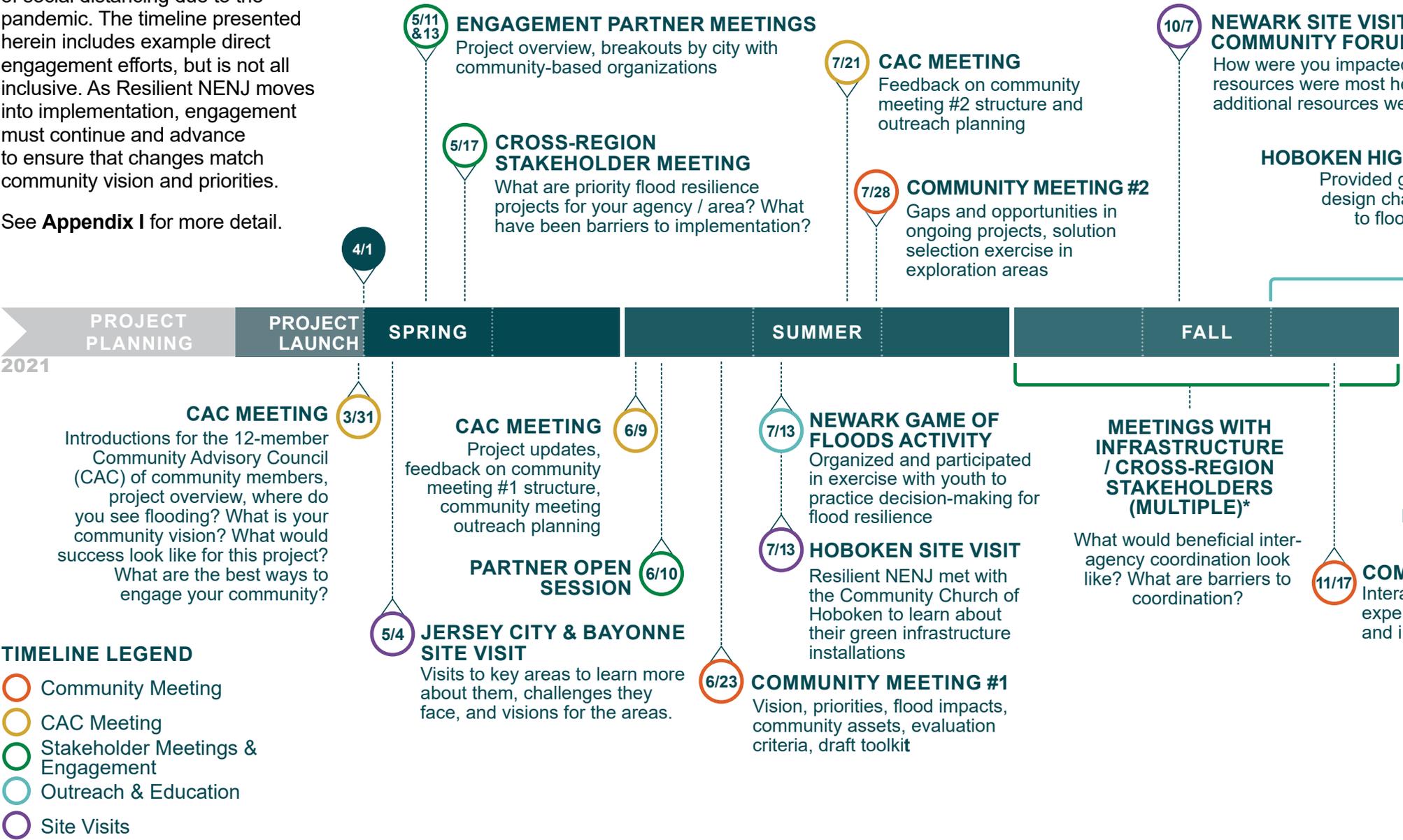


Resilient NENJ’s engagement strategy included any-time engagement opportunities, various forms of outreach to share information, and direct engagement to collaborate and gather input.

ENGAGEMENT TIMELINE

Resilient NENJ engagement kicked off in the spring of 2021, at a time of social distancing due to the pandemic. The timeline presented herein includes example direct engagement efforts, but is not all inclusive. As Resilient NENJ moves into implementation, engagement must continue and advance to ensure that changes match community vision and priorities.

See **Appendix I** for more detail.



POST-IDA
 M
 d by Ida? What
 helpful, and what
 ere needed?

H SCHOOL ENGAGEMENT
 guidance to students on
 allenge projects related
 nding and resilience

WINTER
 2022

COORDINATION FOR FUNDING APPLICATIONS
 Coordination with municipal departments and utilities on FEMA BRIC funding applications

COMMUNITY MEETING #3
 Active presentations from technical experts on flood preparedness, recovery, and individual mitigation actions

2/2 CAC MEETING
 Feedback on Community Meeting #4 structure and draft solutions

2/9 COMMUNITY MEETING #4
 Overview of physical and non-physical solutions being evaluated and how they could shape the region

EARTH WEEK EVENTS
 Tabling at various local community events, including STEAM URBAN Earth Week activities

SPRING

CITY-SPECIFIC COMMUNITY MEETINGS
 Solutions being considered in each city and how they fit with the community and risk contexts

IVY HILL SITE VISIT
 Site visit and meeting with residents in the flood-prone Ivy Hill neighborhood

4/24

HIGH TECH HIGH SCHOOL WORKSHOPS
 Resilience planning workshops with juniors and seniors

FACES OF RESILIENCE CAMPAIGN
 Spotlights of community organizers and local leaders who are working to increase resilience

EDUCATIONAL VIDEO SERIES
 Videos on risk, resilience, and how to get involved (early stages of a Resilience 101 campaign)

SUMMER

6/8 COMMUNITY MEETING #5
 Overview of draft recommendations that will change our built environment and how we work together

6/1 CAC MEETING
 Feedback on Community Meeting #5 structure, public art project, ad campaign, and Faces of Resilience

GOING FORWARD

IN-PERSON EVENTS
MUNICIPAL ENGAGEMENT
ADVERTISING CAMPAIGN
ENGAGEMENT PARTNER MEETINGS
CAC MEETINGS
PUBLIC ART PROJECTS

**Steering Committee coordination, engagement with other municipal and county departments, and meetings with infrastructure and State agencies took place across the project.*

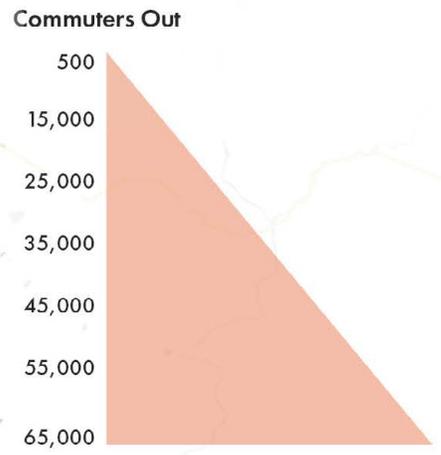
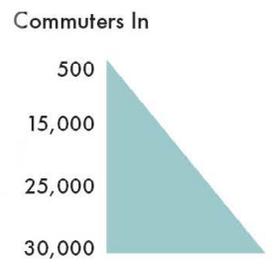
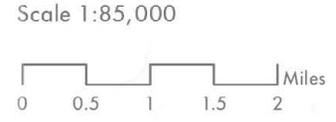
ABOUT OUR REGION

As described in the **About Our Region** report, the Resilient NENJ region is a complex urban environment with some of the most densely populated cities in the state and some of the oldest infrastructure in America. The region is heavily interconnected through transportation and maritime networks, waterbodies, cultures, commerce, and workers. It houses infrastructure and dense transportation networks that support the movement of goods across the region and drive the regional economy.



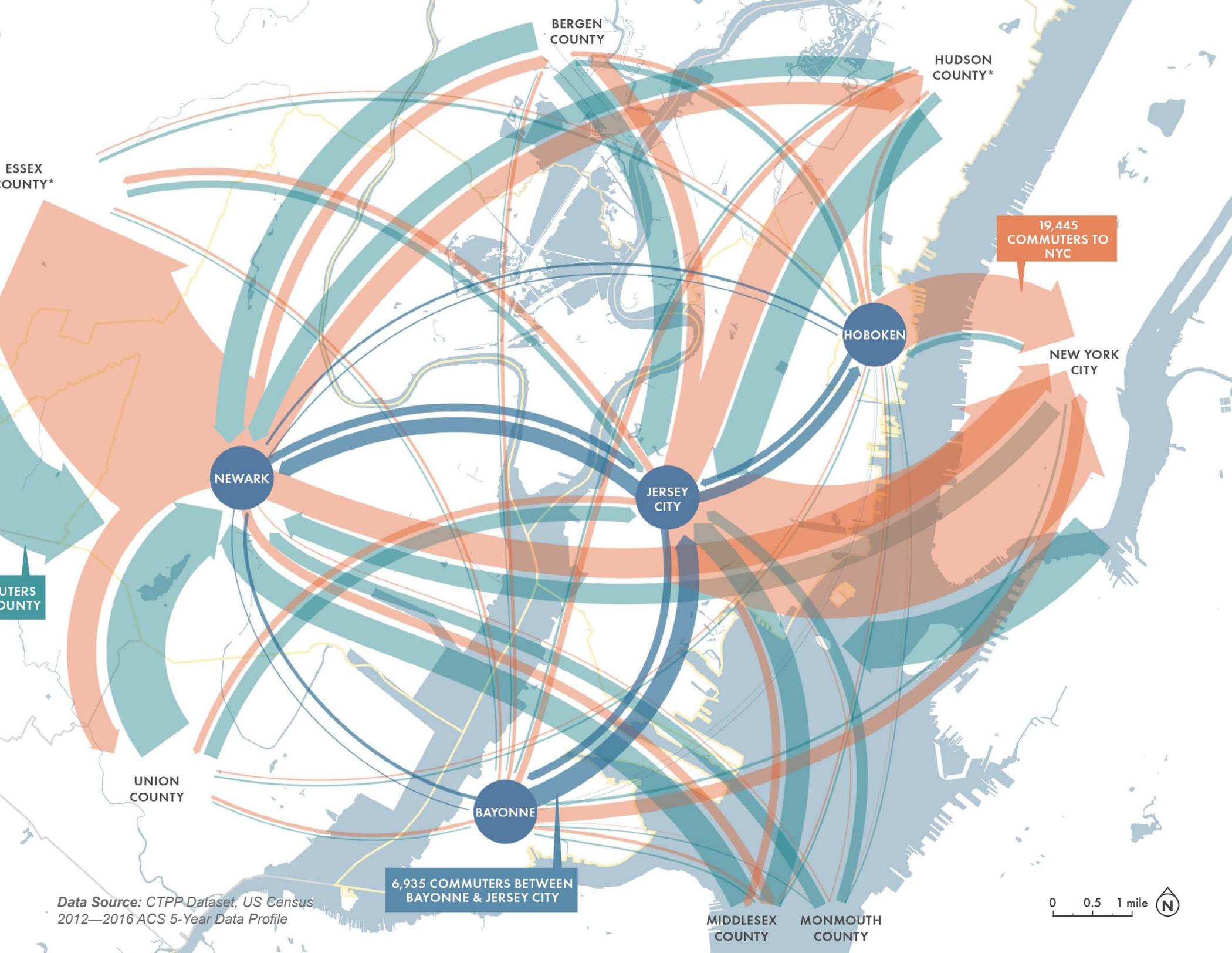
View of Downtown Jersey City from Liberty State Park.
Image Source: Hudson County Division of Planning

Commuter Patterns & Flows



29,035 COMM FROM ESSEX CO

*Remaining Municipalities Outside of Study Area



BERGEN COUNTY

HUDSON COUNTY*

ESSEX COUNTY*

19,445
COMMUTERS TO
NYC

HOBOKEN

NEW YORK
CITY

NEWARK

JERSEY
CITY

UTERS
COUNTY

UNION
COUNTY

BAYONNE

6,935 COMMUTERS BETWEEN
BAYONNE & JERSEY CITY

MIDDLESEX
COUNTY

MONMOUTH
COUNTY

Data Source: CTPP Dataset, US Census
2012—2016 ACS 5-Year Data Profile

0 0.5 1 mile

The region is home to over 700,000 incredibly diverse people who feel great pride in their sense of community. Resilient NENJ's residents have persevered through significant climate-related and other challenges, and their knowledge and expertise are valuable in the effort to increase climate resilience as described later in this Action Plan (see primarily **Section 3.3.2** and **3.3.3**). The region has a notable history of racially discriminatory housing practices called redlining that began in the early- to mid-twentieth century, and its effects can still be felt today. Redlining caused most neighborhoods in NENJ to be subject to the most extreme forms of exclusionary planning and zoning practices. In large part due to these practices, today the region contains some of the most socially vulnerable communities in the state and nation.

Social vulnerability refers to the degree to which people can expect to be challenged when faced with significant disruptions like those that come from climate hazards. Interconnected factors like income, access to transportation, and language barriers may cause some people to feel disproportionate impacts from flood events or other disasters. Some may need more support to prepare for, respond to, or recover from emergencies. Black and Brown communities (due to a history of exclusionary practices), low-income, non-English speaking, elderly, children, unhoused, or physically disabled people are more likely to face these challenges. About 20-percent of the region's residents live below the poverty line.

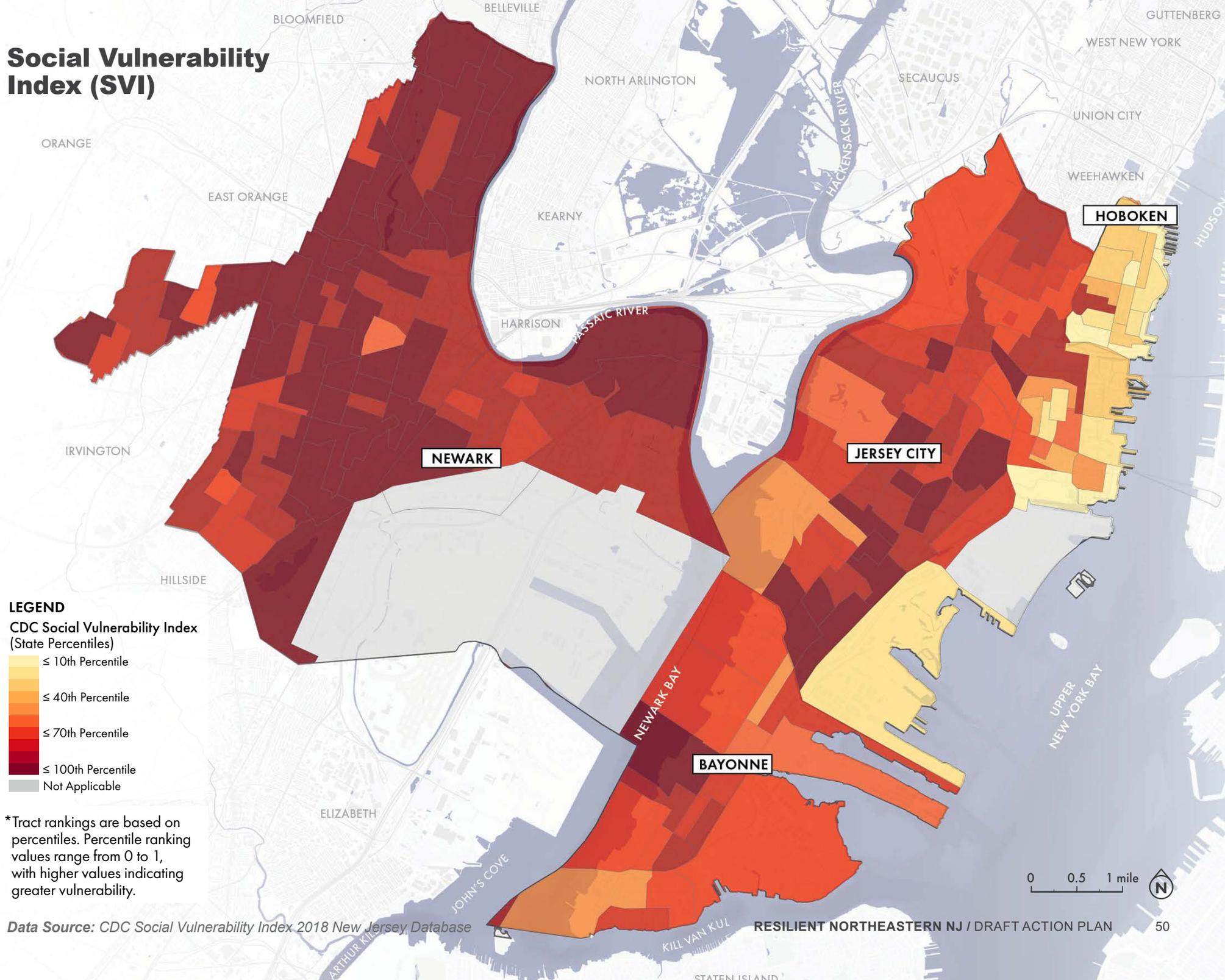
There are various metrics, or tools, for measuring social vulnerability. Resilient NENJ primarily uses the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI). See **Section 3.2.3** for more detail on the CDC SVI. While these metrics are helpful for planning purposes and to identify inequities, they do not speak to people's personal strengths and experiences. Many people have persevered through past challenges and daily inequities despite their limited resources, and there are many groups and individuals that advocate for and work to address environmental justice concerns. It is important to center the experiences of these populations and acknowledge that, without action, they will bear the brunt of the worst and earliest impacts of climate change.



Meeting with Residents in Newark Ivy Hill Neighborhood to discuss repeat flood issues.

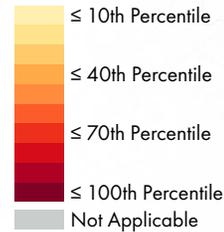
Image Source: Resilient NENJ

Social Vulnerability Index (SVI)



LEGEND

CDC Social Vulnerability Index (State Percentiles)



*Tract rankings are based on percentiles. Percentile ranking values range from 0 to 1, with higher values indicating greater vulnerability.



A flooded home in Newark's Ivy Hill Neighborhood.

Image Source: Janell Richison

NENJ is also notable for its history as an industrial epicenter. The region's industrial legacy is reflected in its high concentration of contaminated sites. The presence of contaminated soils is also related to historical use of land for open dumps or landfills, such as the use of the Meadowlands area for garbage disposal that started in the mid-1900s. The presence of contamination has led to health hazards during past flood events as waters mixed with pollutants and inundated residential areas. This could increasingly pose a threat—especially as groundwater levels rise in parallel with sea level rise.

Due to the region's history of redlining practices, communities of color and other marginalized communities face disproportionately high exposure to these hazards, in addition to other hazards like urban heat island effect and poor air quality. Efforts to prevent and reverse impacts of such practices are commonly known as environmental justice (EJ). As part of New Jersey's EJ efforts, the New Jersey Environmental Justice Law requires NJDEP to evaluate the contributions of certain facilities to environmental and public health stressors in overburdened communities when reviewing operational and development-related permit applications.

The Environmental Justice Law defines an overburdened community as a census block group that is at least 35 percent low income, 40 percent minority, or 40 percent limited English proficiency. As shown in the map on the next page, most of NENJ is classified as overburdened communities under this definition. NJDEP is using data on overburdened communities to guide future planning processes, and the federal government is increasingly using such information to guide funding decisions.¹

Northeastern New Jersey is an extraordinary place with a lot to be treasured, celebrated, and preserved. To do this, decision makers must acknowledge the significant challenges and inequities many communities face, now and into the future, and invest in the resilience and positive transformation of our most under-resourced neighbors and their communities.

¹ White House's Justice40 initiative: <https://www.whitehouse.gov/environmentaljustice/justice40/>

Overburdened Communities

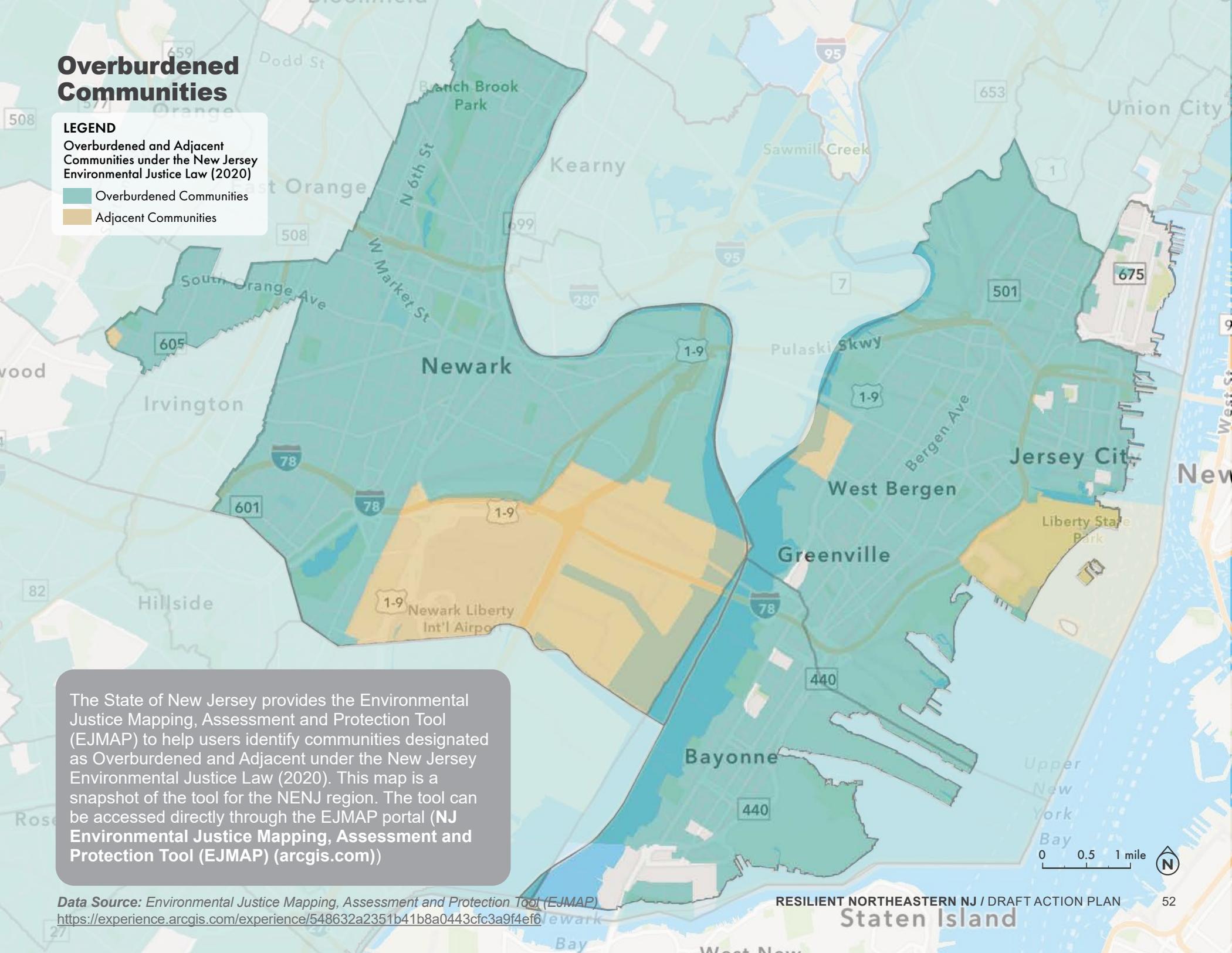
LEGEND

Overburdened and Adjacent Communities under the New Jersey Environmental Justice Law (2020)

Overburdened Communities

Adjacent Communities

The State of New Jersey provides the Environmental Justice Mapping, Assessment and Protection Tool (EJMAP) to help users identify communities designated as Overburdened and Adjacent under the New Jersey Environmental Justice Law (2020). This map is a snapshot of the tool for the NENJ region. The tool can be accessed directly through the EJMAP portal ([NJ Environmental Justice Mapping, Assessment and Protection Tool \(EJMAP\) \(arcgis.com\)](https://experience.arcgis.com/experience/548632a2351b41b8a0443cfc3a9f4ef6))



RESILIENT NENJ'S COMMUNITIES



JERSEY CITY

Jersey City, the county seat of Hudson County, is the second most populous city in New Jersey, with an estimated population of over 292,000.² The city is incredibly diverse and boasts various cultural enclaves, such as Little Manila and Little India. More than 50-percent of Jersey City's population speaks a language other than English at home,³ and common non-English languages include Spanish (51,000 speakers), Hindi (16,000 speakers), Arabic (11,000 speakers), Chinese (9,000 speakers of Mandarin and Cantonese), and Tagalog (7,000 speakers).⁴ The city is bi-coastal with the Hudson River and New York Bay to the east and the Hackensack River to the west, and the Palisades outcrop is a notable geologic feature that runs through the center of the city, giving the Heights neighborhood its name.

Jersey City's economic output is significant, totaling \$33.1 billion in 2019. The city had an estimated 150,000 jobs in 2019, primarily in the commercial banking, investment, banking, real estate, and local government industries, with most banking jobs in downtown Jersey City.⁵ Heavy industrial areas have mostly transitioned to other uses, leaving many large contaminated sites undergoing and in need of clean-ups and redevelopment. Public transit is important for mobility in Jersey City, and the transit system includes several PATH stations, ferry terminals, many bus routes, and the Hudson Bergen Light Rail. Bike usage has increased in recent years with the expansion of bike lanes.

NEWARK

Newark is the most populous city in the State, with over 311,000 residents,² and it is the largest city in NENJ by land area. Spanish and Portuguese are the most spoken languages following English, with over 85,000 and 18,000 documented speakers, respectively, as of 2019.⁶ Participants highlighted Newark's cultural diversity and abundance of cultural events and spaces as some of the city's best features, and the city is rich in community based organizations and youth engagement opportunities. Newark also has the largest concentration of populations with high social vulnerability scores and the highest poverty rate of the four municipalities in the region. Before the COVID-19 pandemic, more than 30-percent of the population reportedly lived below poverty level.⁷

Port Newark on the Newark Bay is part of the Port of New York and New Jersey, owned by the Port Authority of New York and New Jersey (PANYNJ) and is the largest port on the east coast and the third largest port in the country. Other critical transportation infrastructure in Newark includes Newark Liberty International Airport, Newark Penn Station, Newark Broad Street Station, and a NJ Transit bus complex. The air transportation industry accounts for the largest portion of the 174,000 jobs in Newark, alongside the transit and ground transportation and transportation support industries, contributing to a total of \$37.3 billion in economic output.⁵ Newark is home to the Passaic Valley Sewerage Commission (PVSC) Wastewater Treatment Plant (WWTP), which receives combined sewage from Newark, Jersey City, Bayonne, and other cities outside of NENJ. Though critical to the economy of Newark and the wider region, the dense industrial Doremus Avenue corridor, where the WWTP is located, poses environmental and public health concerns for nearby residents. Residents have expressed worry and advocate for action to reduce pollution. Poor air quality likely contributes to elevated asthma levels in the area and may create higher risk for cancer and other health complications.





HOBOKEN TERMINAL

Image Source: davidwilson1949

HOBOKEN

Hoboken, the “Mile Square City,” is small but densely populated with over 60,000 residents.² The city has the highest median annual household income and property values of the cities in the region. Hoboken is majority white and has lower socially vulnerability than the other cities. Still, over a quarter of the population speak a language other than English at home.⁸ Spanish is the most spoken language after English. Southwest Hoboken, in the Hoboken Housing Authority properties area, has the highest CDC Social Vulnerability Index in the city. Transit, full-service restaurants, real estate, colleges, and other educational services industries were the top industries of the 38,400 jobs in Hoboken as of 2019.⁵ 15-percent of all jobs in Hoboken were in the transit industry, and public transportation systems running through Hoboken include NJ Transit rail and buses, PATH trains, Hudson-Bergen Light Rail, New York Waterway Ferry, and the Hoboken Hop shuttle. Many of these transportation lines enter and exit New Jersey through the Hoboken Transit Terminal, which is the third largest transportation terminal in New Jersey.

Flooding has been a longstanding problem in Hoboken, tied to the city’s natural history. Hoboken formerly had a tidal marsh along the current western boundary of the city. This area was filled in and is lower elevation than eastern areas that are closer to the Hudson River and now has the most significant flooding challenges in the city. Hoboken’s well-documented history of flooding has also led the City to be a leader in flood resilience, taking many proactive measures to resolve its issues.

BAYONNE

Bayonne is a peninsula at the southern end of Hudson County, surrounded by the Newark Bay to the west, the Kill van Kull to the south, and the New York Bay to the east. Many beautiful waterfront parks and walkways border these waterbodies, such as Dennis Collins Park, Gregg Park, and Rutkowski Park. The Bayonne Bridge connects to Staten Island. The city of over 73,000 people⁹ is less densely populated than the other cities of the region, but has been undergoing significant redevelopment in recent years. Participants expressed that they value Bayonne’s growing diversity and sense of community.

Like Jersey City and Newark, Bayonne contains high concentrations of socially vulnerable people based on the CDC SVI. Almost 50-percent of Bayonne’s population speaks a language other than English at home,⁸ and common non-English languages spoken in the city include Spanish, Arabic, and Polish. The city’s industrial Constable Hook, Military Ocean Terminal at Bayonne (MOTBY), and Port Jersey areas contribute to the regional economy while also presenting environmental health concerns for nearby communities based on feedback. There were an estimated 24,200 jobs in Bayonne as of 2019 with the most jobs in the local government, hospitals, and warehousing and storage industries, and the city had a total economic output of over \$4.5 billion in 2019.⁵



CONSTABLE HOOK STORAGE FACILITIES

Image Source: gcaptain

² Based on US 2020 Census results

³ <https://www.census.gov/quickfacts/jerseycitycitynewjersey>

⁴ <https://public.tableau.com/app/profile/jersey.city/viz/LanguagesSpokeninJC/Dashboard1>

⁵ Based on 2019 IMPLAN data

⁶ Based on 2019 American Community Survey estimates

⁷ https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html

⁸ Based on 2021 US Census Bureau Population Estimates Program data

⁹ <https://worldpopulationreview.com/us-cities/bayonne-nj-population>

VISION

Documenting the region's vision for itself helps ensure this Action Plan is in line with community priorities. During the spring, summer, and early fall of 2021, the team asked about the places and things people love and the changes they want to see, as well as any challenges and issues they would like to see addressed. Community members told the team that they would like to see more green space, better mobility, a diverse economy, green jobs, and more transparency and two-way communication with government, among other changes.

There are five pillars of resilience that also correlate to the five types of infrastructure in every community: environmental, economic, social, physical, and institutional/governance. The team received vision-related feedback across all five pillars of resilience.

Region-wide, community members indicated that they want to see the following changes in the future:

ENVIRONMENTAL



- Increase trees and green space
- Address issues of air quality and urban heat island effect
- Reduce pollution and combined sewer overflows
- Increase use of renewable energy
- Reduce trash in the streets that clogs catch basins and makes its way into public spaces or bodies of water
- Preserve and enhance ecosystems and habitats

ECONOMIC



- Create new jobs, including higher quality technological and green jobs and train residents for those jobs
- Nurture healthier and safer working and living conditions for communities
- Promote economic diversity and thriving local economies
 - For example, by promoting artisans and small businesses
 - Explore and implement creative economic structures for improving resilience
- Reduce financial burdens of flooding to residents
- Avoid long-term property value loss and community disinvestment from repeat flood events

SOCIAL



- Improve cleanliness, safety, health, food access, and basic quality of life
- Focus on resilience and innovation in the community, leveraging community member strengths and experiences
- Increase affordable, quality housing and housing that promotes diversity of residents
- Mitigate impacts of flooding to daily life
- Preserve and enhance neighborhood and waterfront parks, waterfront walkways, gathering places, and recreational and cultural activities
 - Promote access to these spaces
 - Create new and improved recreation centers, spaces for children to play, public health centers, and spaces to cool off from the heat
- Preserve feeling of a sense of home, community, and cultural diversity

PHYSICAL INFRASTRUCTURE



- Improve access to regional transportation. While many people value existing access to regional roads and public transit, people also expressed the need for improved public transportation and access. For example, people asked for improved connectivity between the cities of the region
- Center pedestrian and biker experience. Many community members requested more bike lanes and pedestrian plazas to improve walkability
- Improve current parking conditions while planning for reduced car dependency in the future
 - Many people in the region expressed a desire to see reductions in car usage and impervious parking areas

RELATIONSHIP WITH GOVERNMENT



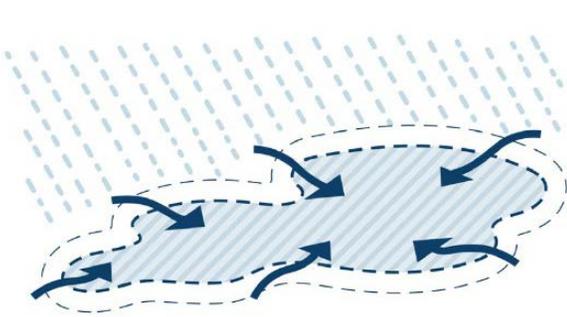
- Communicate more about what actions are being taken to reduce flooding and its impacts
- Increase preparedness and emergency response communication
- Invest in relationship building between government agencies and community members
- Ensure that community needs are met by listening and responding more frequently to residents

FLOOD IMPACT ASSESSMENT

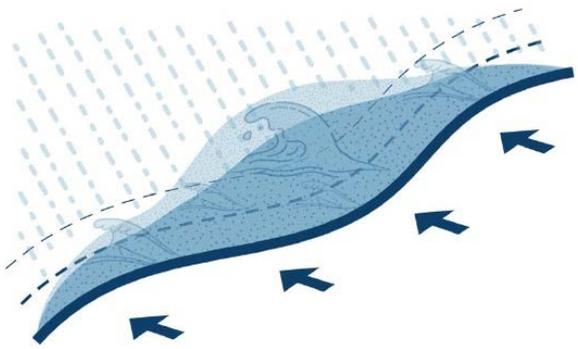
NENJ has had a long and complex relationship with water as a source of both vitality and destruction. NENJ is a coastal region, and the waterfront offers open space, economic opportunity, and sweeping views of the Manhattan skyline. However, the coast also presents risks such as those demonstrated by Hurricane Sandy. Much of NENJ's lands were former wetlands that were drained and filled to allow for urban development, which also contributes to its flood vulnerabilities. Flooding after heavy rainfall is a widespread and worsening issue in the region. The undersized drainage systems and increasing amounts of impervious surfaces, such as concrete and asphalt paving, contribute to flooding from rainfall. Heavy rainfall, coastal storms, and tidal flooding all impact the region today, and this risk is evolving with climate change. Through the Resilient

NENJ process, many residents shared the financial, physical, and emotional burdens that flooding imposes on them. Sea level rise will only exacerbate rainfall, storm surge, and tidal flooding, and warming temperatures are expected to make rainfall more intense over time.

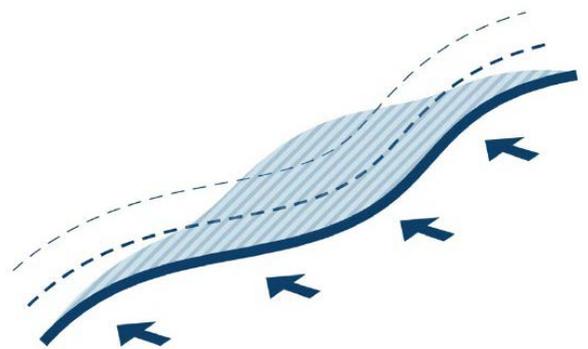
The project team conducted a detailed assessment to understand the region's exposure to flooding and possible impacts if no further action is taken. The results are explained at length in the separate **Flood Impact Assessment** report, with a brief summary of findings included herein.



RAINFALL AREAL & FLASH FLOODING



COASTAL STORM SURGE



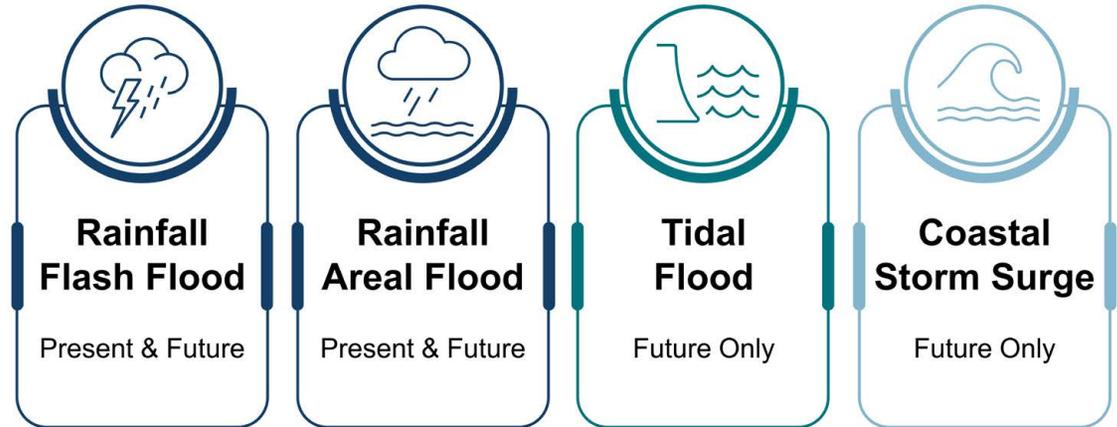
TIDAL FLOODING

WHAT DID THE FLOOD IMPACT ASSESSMENT INCLUDE?

Specifically, the project team evaluated regional and localized impacts for the four different types of flooding described below. The team used large-scale flood models NJDEP developed for use in this project. Although the flood models are helpful for planning purposes to identify priority flood areas, they must be supplemented with more detailed assessment for more granular understanding of risk or for design purposes.

- 1. Rainfall flash flooding** (present and future): Flash flooding occurs when there is a significant amount of rainfall over a short period of time. Water rises quickly and also often recedes quickly. The NJDEP models account for approximately 3.5 inches over two hours, which is more intense than what the region experienced during Floyd (1999), Irene (2011), and Henri (2021) in most places, but lower than Ida (2021). This short duration, high intensity rain event is likely to temporarily overload storm sewers and cause flooding. It may occur suddenly, providing little time for preparation or evacuation. The model representing future conditions includes 10 percent more rainfall than the one representing present day conditions, and includes 2.4 feet of sea level rise over 2000 sea levels (which is used in the present-day models). Sea level rise can make it more difficult for floodwaters to drain.
- 2. Rainfall areal flooding** (present and future): Areal flooding occurs when flooding develops more gradually, comes from sustained rainfall over a longer period, and may not drain for a longer period. The NJDEP models use around 8 to 9 inches over 24 hours, which is similar to Ida or Irene, depending on the area. In fact, Ida started as a flash flood event, but the duration and expanse of rainfall turned it into an areal flood, as well. Storms of this size are likely to overwhelm drainage networks and the models show where significant damage and disruption likely does and

MODELED FLOOD EVENTS



could occur. The term areal flooding comes from the National Weather Service (NWS) Hazardous Weather Warning System to represent inland flooding over widespread extents of low-lying areas. As with the flash flooding models, the model representing future conditions includes 10 percent more rainfall and 2.4 feet of sea level rise over 2000 sea levels. The future model is similar to Ida with 10-percent more rainfall and sea level rise.

- 3. Tidal flooding** (future only): Tidal flooding is the temporary inundation of low-lying areas due to high tides, which occur regardless of the weather. Sea level rise will cause tides to be higher than they are today, and some areas will flood daily. Future high tides will likely flood places along the Hudson, Hackensack, and Passaic Rivers, as well as along Newark Bay and Upper New York Bay. The project team simulated tidal peaks at Mean Higher High Water (MHHW), based on elevations reported at nearby tide gauges. MHHW represents the average of the higher of the two daily high tides. The models add 2.4 feet to the spatially varying MHHW for the region.
- 4. Coastal storm surge** (future only): Tropical storms, hurricanes, and nor'easters can raise water levels along the coast. Storm surge affects areas along all waterbodies in the region, including the Hudson, Hackensack, and Passaic Rivers and the Newark Bay and Upper New York Bay. Hurricane Sandy in 2012 was an example of an event with significant storm surge. The project team modeled an extreme coastal storm surge event developed by taking the observed high-water marks experienced during Hurricane Sandy and projecting them into 2070, assuming 2.4 feet of sea level rise.

FLOODING EXPERIENCES

Resilient NENJ received feedback throughout the Action Plan development process about flood experiences, concerns, and impacts. People shared photos, stories, and notes on specific locations of flooding. Resilient NENJ also pulled reports of flooding from social media and from municipal tracking systems. These reports are mapped in the graphic on the right, and we used this information to “ground-truth” the flood models that were part of the **Flood Impact Assessment**.

A SUMMER OF FLOODING

Several flood events occurred in the summer of 2021. The remnants of Hurricane Ida, in particular, spurred Resilient NENJ to conduct additional engagement with emergency managers and the development of emergency preparedness and response recommendations in this Action Plan. Resilient NENJ prepared a separate **Ida After Action** report to detail findings and recommendations. The **Flood Impact Assessment** and **Vision & Priorities** reports include more on these storms.

STORM

SUMMARY

Tropical Storm Elsa
July 8, 2021

This storm dropped several inches of rain across northeastern New Jersey. Hoboken was especially impacted.

Severe thunderstorms
July 17, 2021

Severe thunderstorms affected all New Jersey. The storms caused significant flash floods and street flooding. Newark was especially impacted.

Tropical Storm Henri
August 22, 2021

Hoboken and Jersey City were especially impacted by this storm. Reported impacts included flooded basements, sewer collapse, and sinkholes.

Remnants of Hurricane Ida
September 1, 2021

These thunderstorms devastated New Jersey and New York. The entire region experienced transportation system impacts and many homes and cars flooded.

Reported Flood Locations

Community Sourced, By Event

- Reported Flood Locations
- Event Specified in Reporting
- Hurricane Irene
- Hurricane Sandy
- July 17 Severe Thunderstorms
- Tropical Storm Elsa
- Remnants of Hurricane Ida

It has disrupted our lives, affected our health, and increased our stress levels. It also makes us feel anxious and worried about if we will ever be able to sell our house or if flooding will get worse with climate change.

My home has flooded frequently in the 41 years I have lived in Hoboken. It has cost me thousands of dollars in repairs and renovations over the years.

Flooding robbed me of treasured things I stored in my basement. Flooding has given me PTSD that is aggravated every time it rains.

I have already had 3 feet of water in my basement. I live in fear each time that there's a storm that it will happen again.

Always fearful that my belongings in my basement will be ruined. Fear of mold forming. Yesterday it took me 40 minutes to drive less than a mile because so many streets were flooded.

Reported flood locations were pulled from community meetings, the Irys app, the survey, other engagement meetings, social media, news reports, official reports of repeat flood locations, and other resident reports.



WHAT ARE THE POSSIBLE IMPACTS?

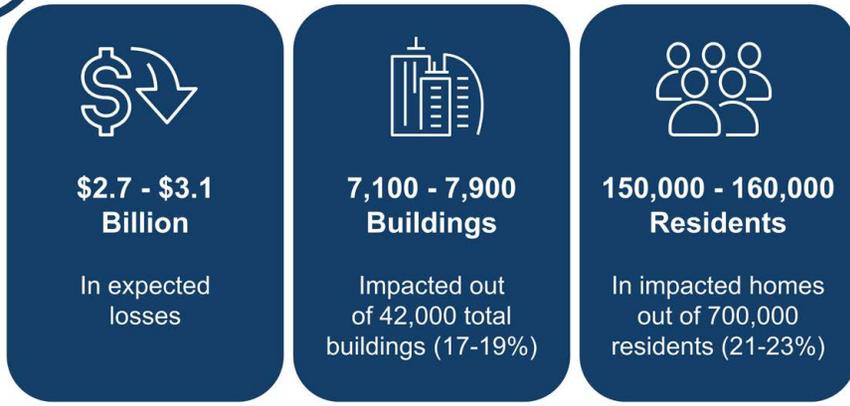
In total, this evaluation revealed expected flood impacts to 2 out of every 5 residents in NENJ, 15,000 buildings with a value of \$61 billion, 1,500 acres of total park space, and 70-percent of the region’s daily economic output.

In addition, NENJ can expect to see significant impacts to many of its most critical infrastructure, emergency response, public health, quality of life, and ecosystem health assets. The **Flood Impact Assessment** provides additional detail on the critical assets that are most at risk.



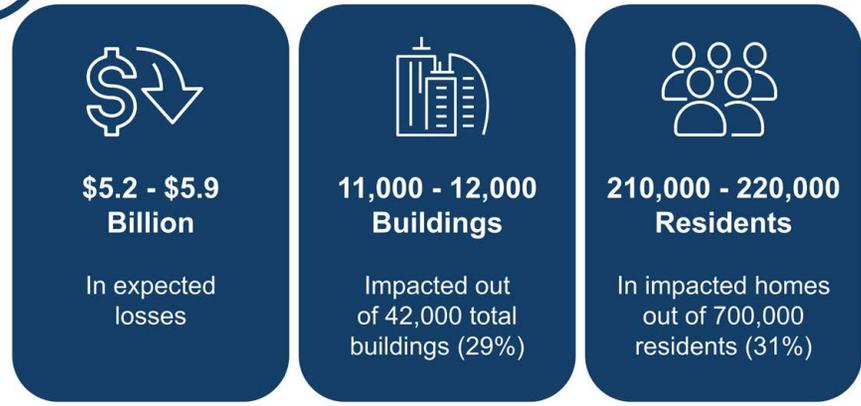
Rainfall Flash Flood

Range indicates change from present to future modeled flood events



Rainfall Areal Flood

Range indicates change from present to future modeled flood events





As pictured here in Hoboken, portions of the walkway are already threatened by rising sea levels.

Image Source: Carter Craft/Outside New York™



Tidal Flood

Future modeled flood event



**\$2.0
Billion**

In exposed
replacement values



**480
Acres**

Of land exposed
where 55 buildings
reside



**420
Residents**

In impacted homes
out of 700,000
residents



Coastal Storm Surge

Range indicates change from present to future modeled flood events



**\$17 - \$31
Billion**

In expected
losses



**5,300 - 7,200
Buildings**

Impacted out
of 42,000 total
buildings (13-17%)



**120,000 - 150,000
Residents**

In impacted homes
out of 700,000
residents (17-21%)

CLIMATE HAZARDS ASSESSMENT

Flooding is not the only climate hazard Northeastern NJ faces. Increasing global temperatures, radical shifts in precipitation and weather patterns, sea level rise, and groundwater table rise will interact in complex ways to threaten the region with various additional hazards, including other (non-flooding) types of severe weather, various direct and indirect risks from groundwater rise, increased drought and threats to water supply, extreme heat, worsening air quality, invasive species and vector-borne illnesses, increased risk of wildfire, and ocean acidification. Prompted by community feedback that requested the team look into issues such as air quality and urban heat island effect, the team conducted an additional assessment to evaluate the risks these and other hazards present to the region, how these risks will evolve as climate change progresses into the future, and the types of impacts expected to people and places. These impacts include those to public health, provision of critical services, or the health and integrity of existing ecosystems and habitats the region's population depend on. The team relied on existing publicly available data and studies to complete this assessment.

The **Climate Hazards Assessment** includes the findings of the assessment, and key insights from the assessment include the following:

- **Social vulnerability.** Some of the most socially vulnerable communities in the state—and in some cases, the country—reside in the region, and Newark and Jersey City in particular, both of which are important regional transportation and economic hubs. These communities also face extremely high urban heat, pollution, and exposure to hazardous waste.
- **Urban heat island (UHI) effect.** Localized urban heat island will be especially acute in NENJ compared to neighboring regions, as large expanses of asphalt and concrete and the loss of forests and open space can trap heat and pollution. Many neighborhoods in the region that also rank high in social vulnerability metrics will experience especially acute pockets of summer heat. Approximately 40-percent of NENJ land area experienced above-average summer heat temperatures in 2021 (supplemented by data from 2020, where needed).¹⁰ These areas are likely to expand and experience more severe and prolonged heat in the future.
- **Air quality.** The two major sources of climate change-related air pollution—ground-level ozone (haze or smog) and PM2.5 (particulate matter, a category of pollutants)—are already a serious problem in NENJ. They are likely the cause of widespread health conditions, such as asthma. Compared to the rest of the state, NENJ has extremely high ambient PM2.5 concentrations, with census tracts mostly within the 80th to 99th percentile range. Nearly the entire region is currently at the highest level of risk (90th to 99th percentile) for cancer and respiratory health impacts due to air toxics, compared to the rest of the state.
- **Wildfire.** Projected higher temperatures and increased frequency of drought are likely to increase the length of the wildfire season in the region in the future. Despite its highly urbanized nature, increasing wildfire risk in NENJ could result in loss of life as well as the destruction of public and private property. To this point, nearly 29-percent of homes in Hoboken and 28-percent of homes in Bayonne could face some risk of wildfire in the next 30 years. Some open spaces, such as Liberty State Park, are at especially high risk. Large-scale fires also have negative implications for air quality and can also increase the incidence of damage from debris from flash floods and mudflows that may follow.

"The entire city of Newark is a heat island."

"I wish there was more tree canopy to combat urban heat."



Urban Heat Island Effect

ORANGE

EAST ORANGE

IRVINGTON

HILLSIDE

ELIZABETH

BLOOMFIELD

BELLEVILLE

NORTH ARLINGTON

KEARNY

HARRISON

NEWARK

BAYONNE

JERSEY CITY

HOBOKEN

GUTTENBERG

WEST NEW YORK

UNION CITY

WEEHAWKEN

UPPER
NEW YORK BAY

JOHN'S COVE

NEWARK BAY

KILL VAN KUL

STATEN ISLAND

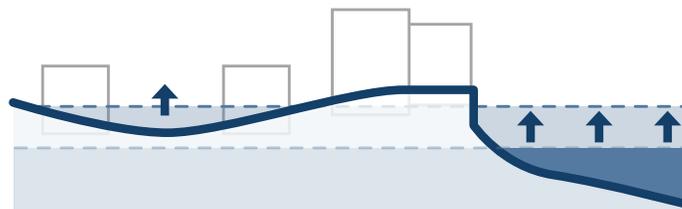
LEGEND
Above Average Summer Heat

- Severe
- Above Average
- Severe Hotspots



Data Source: Heat severity dataset by TPL, accessed through ESRI

- **Invasive species and vector-borne illness.** As temperatures increase, Lyme disease and West Nile Virus will become even greater threats due to a longer warm season. In addition to creating more favorable environments for species that can cause these vector-borne illnesses, increasing temperatures may also facilitate the introduction of other invasive species that could have long-term implications and threaten habitats in NENJ's parks and open spaces.
- **Drought.** Throughout the Northeast U.S., it is anticipated that droughts lasting 3-6 months or even longer will increase in frequency. Northeastern NJ, being primarily within the Passaic and Hackensack water regions, draws most of its water supply from surface water outside of the region, making it more immediately vulnerable to the effects of drought. Drought affects surface water more quickly than groundwater, though the region may increasingly come to rely on groundwater sources in the future. Combined with anticipated rates of population growth, existing sources of drinking water may become increasingly insufficient.
- **Hazardous waste and contamination.** High concentrations of hazardous materials and wastewater discharge throughout the region can pose a serious risk to public health and safety as groundwater levels rise proportional to sea level rise. Remobilized contaminants due to groundwater rise can lead to contaminant plume spread and decrease water quality where contaminant levels in water had previously been improving.
- **Groundwater emergence and basement flooding.** In areas with low depth-to-groundwater, tidal and rainfall conditions combined with sea level rise can lead to risk of groundwater emergence and flooding of basements and underground infrastructure, parks, open spaces, and even streets. If the affected groundwater source is contaminated, this poses an additional risk of sustained exposure to toxic water. Water table data are not readily available for the region.
- **Ocean acidification.** As increasingly acidic ocean pH levels threaten marine life along the coast, NENJ could experience ecological impacts to its estuarine habitats as well as potential longer-term economic stresses. Although most economic impacts affecting commercial fishing-dependent communities will be concentrated in southern New Jersey, parts of NENJ around Newark Bay could still experience impacts of medium economic severity. In the northernmost part of New Jersey, water could start becoming unfavorable to shellfish earlier than the rest of the state—as early as 2071.



GROUNDWATER EMERGENCE

Sea level rise and storm surge cause groundwater table rise and impacts to groundwater quality, in many cases resulting in inland flooding of basements and low-lying areas.

Hazardous Waste & Contamination

ORANGE

EAST ORANGE

IRVINGTON

HILLSIDE

ELIZABETH

BLOOMFIELD

BELLEVILLE

NORTH ARLINGTON

KEARNY

HARRISON

NEWARK

BAYONNE

JERSEY CITY

HOBOKEN

GUTTENBERG

WEST NEW YORK

SECAUCUS

UNION CITY

WEEHAWKEN

STATEN ISLAND

LEGEND

Hazardous Waste Proximity
(State Percentiles)

≤ 10th Percentile

≤ 40th Percentile

≤ 70th Percentile

≤ 100th Percentile

● Known Contaminated Sites

0 0.5 1 mile



Data Source: EPA EJScreen, Proximity to Hazardous Waste Layer;
NJGIN Open Data Known Contaminated Site List Layer

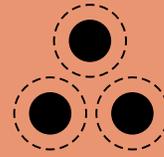
SCENARIOS

The Resilient NENJ team used community and stakeholder feedback, evaluations of risk context, and research on ongoing projects and infrastructure improvements (see Section 2.7) to develop and refine three scenarios consisting of a range of types of actions. To develop scenarios, Resilient NENJ investigated a wide range of possible solutions, leveraging examples from the Flood Resilience Toolbox and Climate Hazard Resilience Toolbox (see **Vision & Priorities** report and **Climate Hazards Assessment** report, respectively). The term “scenario” can have different meaning depending on the context, and for this project it means a suite or package of actions that work together to increase resilience.

Due to the large geographic scale, the team divided the region into study areas for focused evaluation. After initial solution refinement at the study area level, the team mapped solutions at the regional scale to look for gaps and connections and organized them into three scenarios. To advance the final goal of developing an implementable regional Action Plan, the project team grouped the three scenarios by implementation pathway and level of complexity for coordination: Individual Initiative, Shared Responsibility, and Regional Coordination to help guide and communicate the implications of decision making.

Every scenario meets the goals of the Resilient NENJ program, the vision and priorities (see **Section 2.3**), and the threshold evaluation criteria articulated in the **Vision & Priorities** report (also see **Section 3.1**). While each scenario meets these requirements, the scenarios are not alternatives. The preferred scenario presented in this Action Plan is an amalgam of solutions from the three scenarios, developed based on feedback on the scenarios (gathered at Community Meeting #4, city-focused community meetings in March and April of 2022, and other engagement) and deeper technical analyses. The Resilient NENJ website and social media published details and materials about the scenarios and the **Scenario Development** report details the development process and scenario contents.

HIGHLIGHTS OF THE THREE REGIONAL SCENARIOS



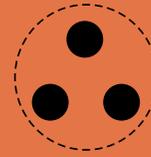
SCENARIO 1: INDIVIDUAL INITIATIVE

Scenario 1 included solutions to increase resilience through actions that can be driven at the municipal level or by agencies or stakeholders independently through existing implementation pathways. Actions, such as green infrastructure practices, would primarily focus on individual publicly owned spaces or private sites. Programs and outreach efforts would be led at the municipal scales through existing relationships. Funding would still come through typical funding pathways, such as federal or state grant or loan programs, and state and regional agencies would continue to provide technical assistance and support. This scenario leveraged existing capacities and readiness for implementation. Actions that are already progressing with an ad hoc approach, such as elevation or hardening of individual properties by owners, would also continue as the status quo.



SCENARIO 2: SHARED RESPONSIBILITY

Scenario 2 included solutions that are best implemented through partnerships, such as those between municipalities, community-based organizations, private institutions, developers, and others, or enhancements on Scenario 1 actions through partnerships. Increased partnerships and coordination would allow for implementation of physical solutions beyond individual parcels, which would improve effectiveness and associated benefits. For example, public-private partnerships could be formed for systematic green infrastructure implementation and coastal protections on private property. Solutions in Scenario 2 also included policy measures to incentivize or require increased responsibility from individual property owners to adapt their properties. Programs and outreach efforts would be led through expanded partnerships between municipalities, community-based organizations, academic and educational entities, and/or other partners.

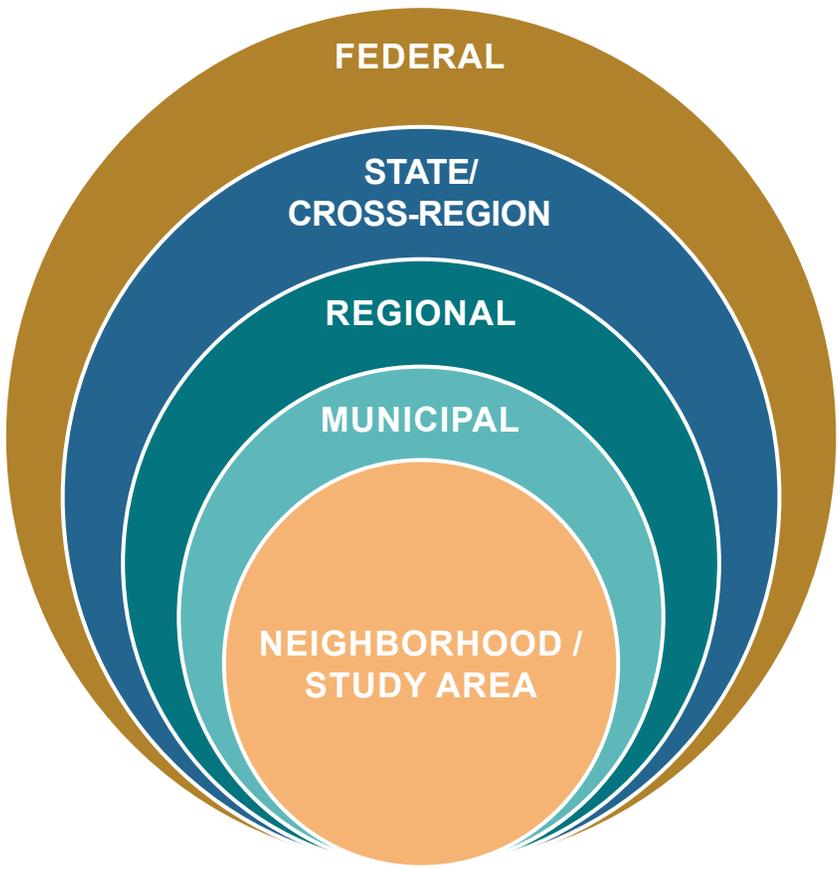


SCENARIO 3: REGIONAL COORDINATION

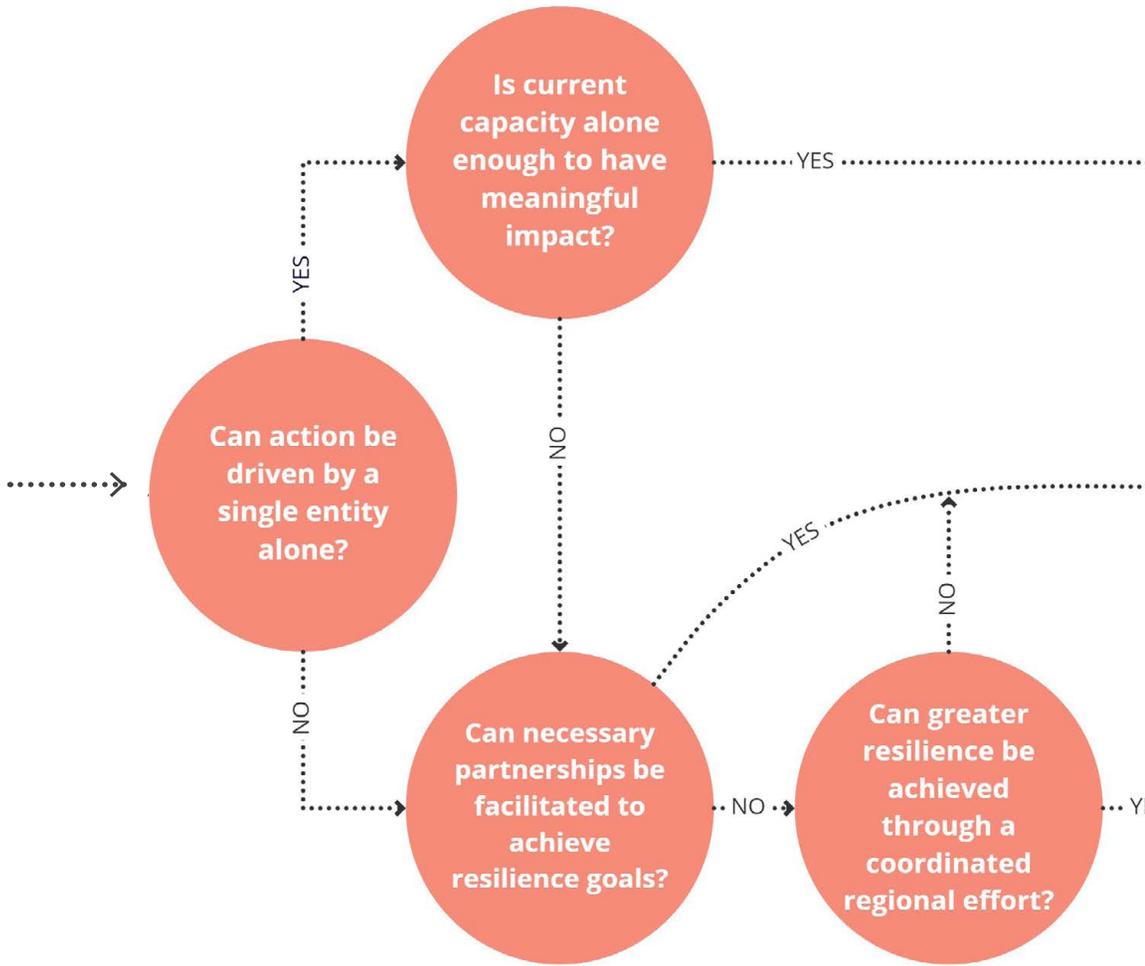
Scenario 3 included actions that can increase capacity for regional coordination and actions that would be implemented at a regional scale through enhanced coordination structures. By implementing solutions at a regional scale versus locally, resources could be pooled and leveraged to target priority areas and achieve more benefits. Scenario 3 promotes regional interconnectivity of people, ecologies, and economies. For example, regional coordination could facilitate creation of regional greenways incorporating stormwater storage, green infrastructure, and wetland restoration. Outreach programs could improve efficiencies and promote consistent communication across the region.

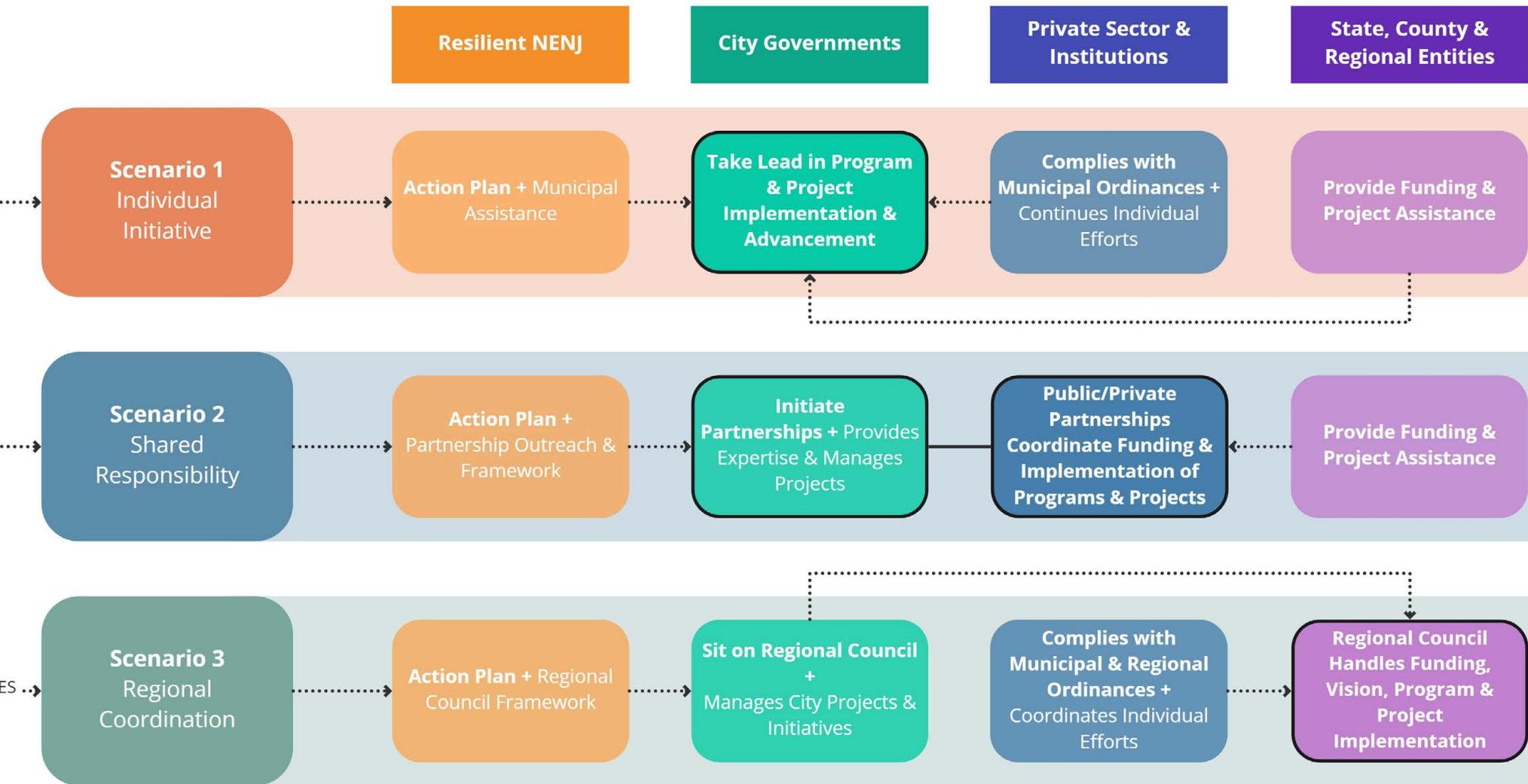
EXAMPLE STRUCTURES FOR IMPLEMENTATION OF ACTIONS FOR THE THREE SCENARIOS

Stakeholder Scales



Key Questions





This visual shows a decision tree to determine how solutions were classified across the three regional scenarios, and roles of different entities in implementation. See more detail in the **Scenario Development** report.

EXISTING INITIATIVES AND “SCENARIO 0” HONORING WHAT IS ALREADY BEING DONE

Resilient Northeastern NJ is not operating in a vacuum. As a regional plan set in the context of ongoing efforts to reduce risk locally, the Action Plan is expected to advance, enhance, or complement initiatives already underway or completed, but never supplant, disrupt, or duplicate what is working.

RELATED POLICIES, STUDIES, AND PLANNING INITIATIVES

Many related initiatives have been led by local, state, federal, regional infrastructure entities, and community-based organizations. This includes actions at the statewide level on policy and governance and planning work to develop recommendations and identify priorities. This section provides summaries of some related initiatives but is not nearly a complete picture of all the ongoing work.

Under the administration of Governor Murphy, New Jersey has taken a proactive approach in preparing for climate change by introducing Executive Orders that create new statewide planning and policy mechanisms and require municipalities to consider climate change and resilience in their state-mandated master planning processes. Existing statewide initiatives are below. The next page includes additional examples of related initiatives at the local and regional levels.

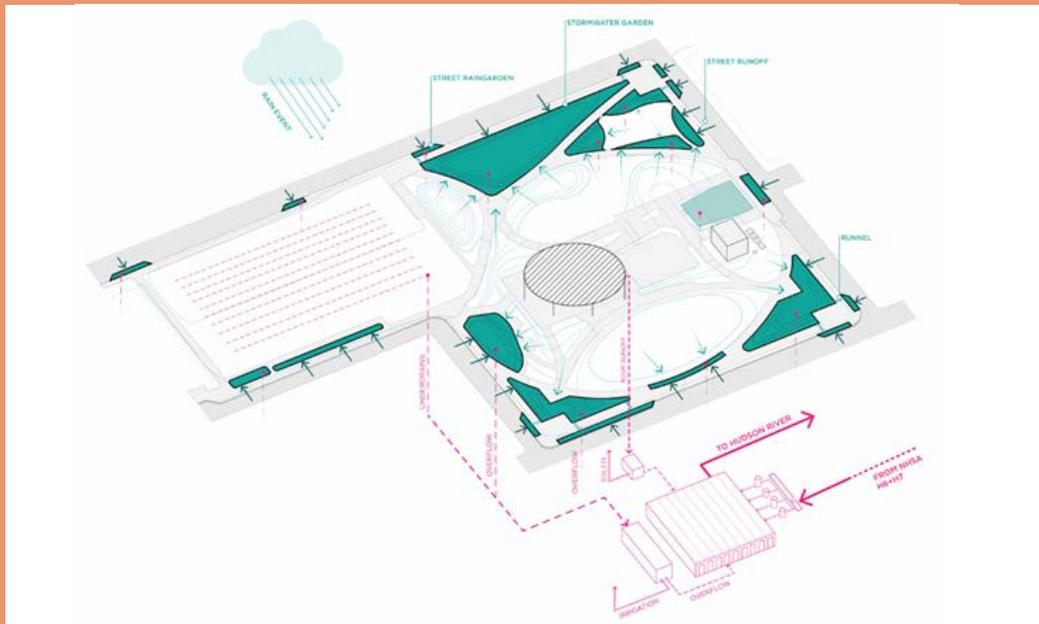
- Executive Order 89, which required the state to develop a **Statewide Climate Change Resilience Strategy** and created an Interagency Council on Climate Resilience.
- Executive Order 100, which launched New Jersey Protecting Against Climate Threats (NJ PACT), an initiative aimed at modernizing land use requirements to incorporate climate change. Administrative Order 2020-01 implements EO 100 and set deadlines for NJDEP rule changes.
- NJDEP initiated a regulatory program in 2015 requiring utilities operating combined sewer systems to develop Long-Term Control Plans (LTCP) that identify projects to be implemented in the coming decades to reduce combined sewer overflows.
- In March 2019, the Stormwater Utility Law, officially known as the “Clean Stormwater and Flood Reduction Act,” was signed into law. This law authorizes local and county governments and certain utilities the ability to create stormwater utilities that can assess fees and use the revenue to maintain stormwater management infrastructure.
- The State has also begun tackling its legacy of pollution and environmental racism through the Environmental Justice Law (S232, September 2020), which requires NJDEP review of new construction, expansions, or permit renewals at facilities causing pollution in overburdened communities.
- New legislation passed in the State Assembly (New Jersey Assembly Bill 2785) requires the land use plan element of municipal master plans to include climate change-related hazard vulnerability assessments. The **Climate Hazards Assessment** completed by Resilient NENJ meets some of these requirements.

RESILIENCE-RELATED PROJECTS

Many ongoing or completed physical actions are already working to increase resilience in the region. Resilient NENJ created an inventory of these examples, dubbed “Scenario 0,” including actions being taken by the four cities, counties, state and federal agencies, regional infrastructure agencies, utilities, and others. Scenario 0 serves as a baseline scenario that imagines what risks would look like with completion of all in-progress projects. The projects address resilience through a variety of approaches including elevation of critical infrastructure, construction of flood barriers or levees around critical infrastructure or vulnerable areas, installation of green infrastructure or large stormwater storage tanks, and wetland restoration or creation. Scenario 0 also includes the Long-Term Control Plan projects that relate to hazard mitigation (see **Appendix G**). **Section 3.0** includes maps of Scenario 0 or summaries of examples, divided by the type of solution or type of hazard the solution addresses. **Appendix A** provides additional detail on Scenario 0 projects.

REBUILD BY DESIGN – HUDSON RIVER IN HOBOKEN

The Rebuild by Design-Hudson River project was awarded funding by the U.S. Department of Housing and Urban Development (HUD) and is currently underway. This project is an example of a project included in “Scenario 0.” Funded by an initial \$230 million allocation from the federal government and supplemented with other funding sources, this project is an example of the scale of investment that can be needed to address flood risk in urban, densely populated areas. The project includes both rainfall and coastal storm surge mitigation components, summarized as Resist, Delay, Store, and Discharge. The Resist, or coastal, portion is managed by NJDEP and involves construction of permanent and deployable flood barriers in the northern and southern portions of the city. This project is expected to reduce storm surge risk for 85-percent of Hoboken’s population that resides within the 100-year FEMA-mapped flood hazard area. The Delay, Store, and Discharge portion is managed by the City of Hoboken along with partner North Hudson Sewerage Authority (NHSA) and focuses on rainfall stormwater management and green infrastructure components that complement Hoboken’s long list of other ongoing and planned projects, such as resiliency parks like Northwest and Southwest Resiliency Park, sewer separation, and pump station improvements. More information on the Rebuild by Design-Hudson River project is available through the City of Hoboken’s [Coastal Flood Mitigation webpage](#), the City’s [Rainfall Flood Mitigation webpage](#), or NJDEP’s [Rebuild by Design-Hudson River webpage](#).



Stormwater system design for Hoboken’s Northwest Resiliency Park.

Image Source: City of Hoboken

NEWARK FLANKING PLAN

Another example of a “Scenario 0” project is the United States Army Corps. of Engineers (USACE) Passaic River Tidal Protection Area Project. The project is in the design phase for the selected alternative, which is referred to as the Newark Flanking Plan, and proposes storm surge protections for the Ironbound area by cutting off flood pathways with a network of flood barrier segments, levee segments, road closure structures, a railroad closure structure, and interior drainage features. When completed, this project may play a significant role in reducing storm surge flood impacts in the Ironbound neighborhood of Newark.



Risk Management Area of Recommended Plan with 14-foot NAVD88 Floodplain.

Image Source: Figure 19 of USACE’s [Final Integrated Hurricane Sandy General Reevaluation Report & Environmental Assessment for the Passaic River Tidal Protection Area](#)

EXAMPLES OF RELATED POLICIES, PLANNING, AND INITIATIVES (NOT ALL-INCLUSIVE)

HURRICANE SANDY RECOVERY PLANNING

In 2013, Hoboken prepared a **Hoboken Resiliency and Readiness Plan** that proposed actions for Hoboken to take in response to Hurricane Sandy. In 2014, **Jersey City** and **Hudson County** developed Sandy Strategic Recovery Planning reports to document damages from the storm and propose draft Action Plans.

TRANSPORTATION PLANNING AND RESILIENCE

The North Jersey Transportation Planning Authority (NJTPA) is the metropolitan planning organization (MPO) that includes this region. NJTPA has a **climate change initiatives program** and sponsors many projects and studies to understand vulnerabilities and advance resilience actions in coordination with other local, regional, and state entities.

HAZARD MITIGATION PLAN UPDATES

The Resilient NENJ municipalities participated in county-level hazard mitigation plan updates for **Hudson County** and **Essex County** in 2020.

MASTER PLAN UPDATES

Municipalities are required to update their master plans at least every ten years. The master plans include many recommendations related to addressing flooding and other climate hazards.

- Under the **Engaging and Strengthening Hudson County** initiative, Hudson County concurrently developed the 2016 Hudson County Master Plan Re-examination, Parks Master Plan, Comprehensive Economic Development Strategy Plan, and County Capital Improvement Plan.
- Hoboken's 2017 **Green Building and Environmental Sustainability Element** and 2018 **Land Use Element** included numerous sustainability and resilience recommendations.
- Bayonne most recently prepared its **Master Plan Re-examination Report** in 2017 with recommendations focused on growth through mixed-use development, redevelopment of industrial sites, and economic revitalization.
- Jersey City 2021 **Land Use** and **Open Space** elements integrated resilience as one of four key principles.
- Newark is currently undertaking a master plan update process.

GUIDELINES TO RESIDENTS AND BUSINESSES

Hoboken released **Resilient Building Design Guidelines** in 2015 to summarize construction requirements in flood hazard areas and provide guidance on best practices to residents and businesses. Hoboken's **2022 addendum** expanded the guidelines to include heavy rainfall. Jersey City prepared a similar **Resilient Design Handbook** in 2018 with information on incorporation of green infrastructure and designing resilient buildings.

See **Appendix A** for a table of existing non-physical initiatives.

VULNERABILITY ASSESSMENTS AND COMPREHENSIVE RESILIENCE PLANNING

There have been numerous resilience-related planning and policy initiatives within the region, and Resilient NENJ has incorporated recommendations from these other initiatives or expanded on efforts as relevant. Jersey City's comprehensive resilience planning has included a citywide risk and vulnerability assessment, the identification of priority areas, and the recommendation of projects to address resilience in those priority areas, summarized in the Resiliency Master Plan, Adaptation Master Plan, and Urban Environmental Green Infrastructure Plan (summary document [here](#)). Resilience planning in Newark has been led by a variety of players, including at the federal, municipal, and neighborhood levels, to yield outputs such as a **Coastal Vulnerability Assessment** and **Green Infrastructure Feasibility Study**, and the Ironbound Community Corp. 2015 Newark Resiliency Action Plan and **South Ironbound Resiliency Action Plan**. Meanwhile, in the last decade, Hoboken has been a regional and national leader in coastal and stormwater resilience, having had strong municipal leadership in performing comprehensive resilience planning by incorporating sustainability and resilience principles into existing municipal planning processes.

HIGHER DEVELOPMENT STANDARDS

Jersey City's Flood Overlay Zone Ordinance, adopted in 2020, applies to all properties located in FEMA-mapped flood areas. It includes requirements for green infrastructure and resilient site design for new developments in the AE or VE zones (based on regulatory FEMA maps). Strategies such as vegetated walls, green roof, permeable pavement, bioretention, and WaterSense fixtures can be used to meet these requirements. In 2022, Hudson County adopted new **Land Development Regulations** that include higher standards for stormwater management with lower thresholds for requirements to be triggered, in alignment with an updated Jersey City stormwater management ordinance. The City of Bayonne incorporates higher standards, such as land elevation and shoreline stabilization, into redevelopment plans to promote resilience.

REGIONAL GREENWAYS

There are proposals for several regional greenways that run through the region, including the **Morris Canal Greenway**, the **Essex-Hudson Greenway**, and the **Hackensack River Greenway**. The proposals generally include bike and pedestrian trails with incorporation of green space, and there are projects underway to complete portions of the greenways. The State of New Jersey recently announced the State purchase of 9 miles of an abandoned rail line to transform into the Essex-Hudson Greenway. The **Hudson River Waterfront Walkway** is a near complete existing waterfront walkway that is greatly valued by the region's residents. There are also groups advocating for local greenways along the **Embankment** and the **Bergen Arches** in Jersey City.

CLIMATE AND ENERGY ACTION PLANS

Jersey City's **2021 Climate and Energy Action Plan** and Hoboken's **2019 Climate Action Plan** focused on reducing greenhouse gas emissions and carbon neutrality.